

A RETROSPECTIVE STUDY ON PERCUTANEOUS PIGTAIL CATHETER DRAINAGE VERSUS PERCUTANEOUS NEEDLE ASPIRATION IN THE MANAGEMENT OF LIVER ABSCESS

Kedar Nath Nayak¹, Bhanjan Kumar Meher², Manoj Kumar Dehury³, Rakesh Ranjan Swain²

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Corresponding Author:

Dr. Rakesh Ranjan Swain,

Email: drakesh.swain19@gmail.com

ORCID: 0000-0002-6930-1413

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¹Associate Professor, Department of General Surgery, Government Medical College & Hospital, Sundargarh, Odisha, India.

²Assistant Professor, Department of General Surgery, Bhima Bhoi Medical College & Hospital, Balangir, Odisha, India.

³Associate Professor, Department of Anatomy, Government Medical College & Hospital, Sundargarh, Odisha, India.

Abstract

Background: A liver abscess is a significant health problem in tropical countries. Management of liver abscesses comprises of suitable antibiotics and draining the abscess cavity. Now abscess drainage by percutaneous pigtail catheterization is gaining wide acceptance over percutaneous needle aspiration. In this study we studied the role of percutaneous pigtail catheter drainage and needle aspiration in the management of liver abscesses. **Materials and Methods:** This study was a retrospective analytical study conducted in a tertiary care centre in eastern India. Patients admitted with the diagnosis of liver abscess with age more than 18 years were included in this study. Patients were divided into three groups as per the treatment they received, Group I-Conservative management, Group II- Percutaneous needle aspiration, and Group III- Percutaneous pigtail catheter drainage. **Result:** A total of 96 patients with a liver abscess were analysed. There was male predominance (93.75%). Mean abscess volume in Group III (309.2±214.4 ml) was significantly higher when compared to Group I (128.4±73.8ml, p = 0.002) and Group II (182.2±130.2; p = 0.003). In the treatment groups, the period of hospital stay and volume of residual abscess at the time of discharge did not have a statistically significant difference. Placement of pigtail catheter in case of abscesses with volume more than 150 ml shortened the hospital stay, whereas it increased the hospital stay in patients with abscess volume less than 150 ml. **Conclusion:** Percutaneous pigtail catheterization could be a better interventional modality for the management of liver abscess. It was concluded that the use of pigtail catheter in patients with liver abscess volume more than 150 ml improved the clinical outcome.

INTRODUCTION

Liver is a major and vital organ of our body. A liver abscess is a collection of pus that occurs due to the entry of microorganisms either from hematogenous spread or by ascending infection through the biliary ductal system. The three common types of liver abscess are amoebic origin or pyogenic origin and sometimes mixed in nature. In developed countries, a mixed type of liver abscess is more prevalent while amoebic pathology is more common in tropical countries. In spite of the enhancement in cleanliness and the improvement of treatment methods, amoebic and pyogenic liver abscesses are an important cause of morbidity or mortality in the tropical and subtropical regions of the world.^[1]

The first approach in the management of a liver abscess is medical treatment in the form of antimicrobial therapy. About one-fifth of patients with liver abscesses remain refractory to antimicrobial therapy.^[2] These refractory cases require radiology guided intervention. Presently, due to the liberal use of ultrasonography and computerized tomography scanning of the abdomen, early diagnosis and treatment of liver abscesses is possible.

Continuous catheter drainage in the form of Pigtail catheter drainage (PCD) and percutaneous needle aspiration (PNA) of abscesses are considered to be highly useful in large size abscesses, which are usually refractory to conservative antimicrobial therapy.^[3] Obtained data encourages the trend towards the preferable use of continuous catheter

drainage in the form of pigtail catheterization for liver abscess management.^[4] There is limited data regarding treatment recommendation based on abscess volume and cavity size. Our study concentrated on the role for antimicrobial treatment in the management of liver abscesses along with the need of intervention in the form of PCD or PCN with respect to the volume of abscess at hospital admission and discharge.

MATERIALS AND METHODS

This is a retrospective analytical study conducted at a tertiary care hospital in eastern India. The study duration was March 2017 to March 2020. A total of 96 patients with a confirmed diagnosis of liver abscess were taken from the available record section of our institute.

All patients admitted with clinical features and USG abdomen findings of liver abscess, irrespective of sex and abnormality in liver function test (LFT) were included in this study. Exclusion criteria were patients with age less than 18 years, abnormal International Normalized Ratio (INR) of >1.5, ruptured liver abscess with the features of peritonitis and who refused to submit consent for invasive procedure. Data were collected in predesigned format regarding clinical features, possible risk factors, associated comorbidities, laboratory investigation finding, management strategies, and treatment outcomes.

Patients with positive serology for *Entamoeba histolytica*, with or without positive stool microscopy for trophozoites and cysts are regarded as of amoebic origin. Patients with positive for pus culture and/or blood culture for bacteria was regarded as bacterial or pyogenic origin. If both serology and culture were positive then the case was considered as mixed type. All patients on admission were put on empirical intravenous antibiotic in the form of Injection ceftriaxone 1 gm bid and Injection metronidazole 500 mg tid. Antibiotics were revised as per the culture sensitivity report or there was no response to initial treatment. Patients were divided into three groups based on treatment modalities they received during hospitalization. Group I comprised of cases who underwent conservative treatment in the form of intravenous antibiotics only, Group II consisted of patients who were subjected to percutaneous needle aspiration (PNA), and Group III consisted of patients who underwent pigtail catheter drainage (PCD). Duration in days to achieve clinical recovery in the form of relief of pain and fever were recorded. Patients were discharged only after improvement and the period of hospital stay in days were recorded for outcome evaluation.

Statistical Analysis

Data were evaluated using SPSS version 24 (IBM Corp., Armonk, NY). Continuous variables were mentioned as mean (\pm standard deviation); numeral

and percentages were mentioned for categorical variables. The help of analysis of variance (ANOVA) test was taken to find the statistical significance of continuous variables between different groups. Pearson's coefficient correlation and multiple logistic regression were utilized to find out the association between variables.

RESULTS

A total of 96 patients with diagnosis of liver abscess were included in this study. The mean age of the study group was 42.6 ± 16.3 years. The disease was found to be male predominant (93.75%). Alcoholism and tobacco smoking was found to be the most common associated risk factors. The most common presenting symptom was pain abdomen (85.4%) followed by fever (76.04%). Most patients presented with the clinical symptom of right upper quadrant pain. [Table 1].

Table 1: Gender, risk factor, etiology and clinical picture of patients with a liver abscess

Total No. of patients (n=96)	Variables	Number (%)
Gender distribution	Male	90 (93.75%)
	Female	6 (6.25%)
Risk Factors	Alcoholic	60 (62.5%)
	Smoking	58 (60.41%)
	Diabetic	10 (10.41%)
	Hypertension	6 (6.25%)
Etiological agent	Amoebic	75 (78.12%)
	Pyogenic	9 (9.37%)
	Mixed	7 (7.29%)
	Not known	5 (5.2%)
Presenting Symptoms	Pain abdomen	82 (85.41%)
	Fever	73 (76.04%)
	Anorexia	65 (67.7%)
	Nausea/vomiting	34 (35.41%)
	Weight loss	43 (44.79%)
Clinical Signs	Anemia (Hb< 10gm%)	8 (8.33%)
	Icterus	8 (8.33%)
	Ascites	14 (14.58%)
	Pleural effusion	32 (29.7%)

The right lobe of liver was predominantly involved with abscess in 85.4% of cases, followed by both lobe involvement in 8.3% of cases. Multiple liver abscesses were encountered in 12.5% of cases. Etiology could be established in 91 (94.7%) patients with 78.1% being amoebic origin, 9.37% being pyogenic origin and 7.29% cases of mixed type. 5 patients (5.2%) were negative for both amoebic serology and pus culture.

All study population received antibiotic therapy. Out of 96 patients 12 (18.8%) patients were treated with percutaneous needle aspiration (PNA), and 53 (55.2%) patients underwent pigtail catheter drainage (PCD). The decision for conservative treatment or requirement of intervention i.e. PNA or PCD for the patient was made by the treating team and radiologist. Different variable and management data were compared and analyzed among three treatment groups [Table 2]. Mean abscess volume at admission

in Group III (309.2 ± 214.4 ml) was significantly higher when compared to Group I (128.4 ± 73.8 ml; $p=0.002$) and Group II (182.2 ± 130.2 ; $p=0.024$), while there was no significant difference between Group I and Group II ($p=0.27$). The period of hospitalization and residual abscess volume during discharge did not vary remarkably between treatment groups [Table 2].

The association between the period of hospital stay and management strategies was further evaluated as per the volume of liver abscess at the time of hospital admission. This indicate that pigtail catheter drainage in abscess volume < 150 ml was associated with a significant increase in the duration of hospital stay ($p = 0.011$). But, pigtail catheter drainage in an abscess volume of 150-300 ml was not associated with an increase in the period of hospitalization [Figure 1].

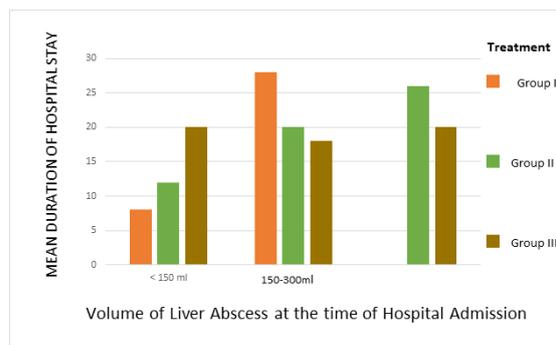


Figure 1: Association between duration of hospitalization and treatment strategies according to liver abscess volume

Table 2: Comparisons of data between different treatment groups

Parameters(Mean±SD)	Total (n=96)	Group I (n=25)	Group II (n=18)	Group III (n=53)	P value
Age in Years	42.6±16.3	39.12±11.9	43.8±19.1	46.5±14.5	0.52
Hospital Stay (Days)	17.9±10.7	14.5±13.8	16.8±8.3	19.9 ± 9.2	0.21
Hemoglobin (gm %)	11.8 ± 2.1	12.8±2.0	11.6±1.8	10.9±1.8	0.004
Total leucocyte Count (TLC)	14234±6198	14026±6308	11467±6040	16380±6234	0.15
ESR	76.4±26.8	73.4±25.6	69.5±24.8	84.6±28.9	0.24
C-Reactive Protein	128.2±85.3	132.8±106.9	125.7±63.9	128.6±82.4	0.97
AST/SGOT	59.6±48.6	36.3±19.2	57.2±42.9	72.6±60.2	0.14
ALT/SGPT	52.4±40.8	38.7±35.2	63.1±45.8	53.2±42.2	0.32
Total Bilirubin	1.2±0.9	0.8±0.6	1.3±0.8	1.4±1.1	0.22
Abscess Volume on admission day	232.5±193.2	128.4±73.8	182.2±130.2	309.2±214.4	0.002
Abscess Volume on Discharge day	19.3±15.3	16.4±15.9	15.7±14.8	23.8±16.2	0.25
Duration of Metronidazole treatment	23.2±8.2	20.6±8.2	24.1±8.2	25.2±8.8	0.28

ESR- Erythrocyte sedimentation rate, AST- Aspartate aminotransferase, SGOT- Serum glutamic-oxaloacetic transaminase ALT- Alanine aminotransferase, SGPT- Serum Glutamic-pyruvic transaminase

DISCUSSION

Liver abscess is a significant health problem in tropical countries. The common infective agents causing liver abscesses are Entamoeba histolytica (amoebic), bacteria (pyogenic), and Mycobacterium tuberculosis.^[5] In tropical countries amoebic liver abscess is more frequent and their incidence is more than 50 million cases and 1 lakh deaths per year.^[6,7,8] The right lobe of liver was predominantly involved with abscess in 85.4% of cases in this study, which was like previous studies.^[6,9] Etiology could be established in 94.7% of patients, of which 78.12% were of amoebic origin. This condition was more common encountered in the younger patients, so prompt treatment is necessary to decrease the morbidity and mortality in this age group. Frequent presenting complaints of liver abscess are pain abdomen, fever, decreased appetite, and loss of weight.^[10] Due to easy availability of ultrasonography which a non-invasive diagnostic modality, diagnosis of liver abscess has become simple. Still its effective management with antimicrobial therapy with/without percutaneous

intervention for early recovery is still a grey area. With the emergence of interventional radiology, percutaneous intervention in the form of PNA or PCD is favoured in the treatment of liver abscesses.^[4,5] The mean abscess cavity volume was remarkably higher in Group III who were managed with PCD as compared to Groups I and II in this study. In spite of this, Group III patients had a similar duration of hospital stay and antibiotic therapy. There are some valuable randomized control trials to compare the efficacy of PCD and PNA.^[1,11,12,13,14,15] with varying results. Out of them, three trials revealed PCD to be the preferred procedure for abscess drainage, and it is more efficacious if cavity size is more than 10 cm size.^[1,11,14] Yu et al. resolved that difference in the duration hospital stay and clinical improvement when compared PCD vs PNA was insignificant in abscess size of around 5 cm.^[12] But, Zerem and Hadzic et al. think that PNA is the preferred technique if the abscess cavity size is < 5 cm size [13]. A meta-analysis by Cai YL et al. also concluded that PCD is more preferable than PNA [4]. The disadvantages of PNA are it require multiple attempts of aspiration in larger cavity size abscesses and there is risk of re-accumulation. We also

evaluated the outcome of abscess cavity volume and management protocol on the duration of hospital stay. PCD was effective option for abscess drainage if the cavity volume was >150 ml. However, it was accompanied with rise in duration of hospital stay if carried out in abscess volumes <150 ml. Kulhari M et al. described better clinical result with PCD over PNA in the patients with roughly similar volumes of liver abscess (293±130 mL in the PCD group and 291±138 mL in the PNA group, P=0.925).^[15] Rajak et al. also concluded that higher abscess volume was associated with decreased success of PNA.^[10] Many studies reported the comparison between conservative management and the percutaneous aspiration technique. Most of these studies were done before the extensive use of PCD for the liver abscesses. These studies demonstrated that PNA was more successful in higher abscess volume.^[16,17,18] In our study, conservative treatment was comparable to PNA in relation to period of hospitalization and duration of antibiotics used, also the abscess volume was close in both groups (128.4±73.8 vs 182.2±130.2 ml, p = 0.25).

Complications of PCD were main issues in previous studies.^[18] No significant complications were seen PCD patients in this study. The current studies also report that complication rates are not very different in PCD vs PNA in the treatment of liver abscesses.^[19] PCD decreases abscess size and cavity volume rapidly and is associated with less complications than PNA.

Liver lobe involvement and causative organism were not found to affect the result of different management strategies in our study.

The limitations of our study were single center study, retrospective analysis and selection bias with respect to the preferential use of pigtail catheter in cases with large cavity abscess.

CONCLUSION

Liver abscess is a male predominant disease seen in young to middle-aged males in tropical nations. Effective treatment in the form of drainage decreases the duration of antibiotics and length of hospitalization. With the emergence of interventional radio diagnosis, percutaneous pigtail catheter drainage has become a recommended decision for the management of liver abscesses. We concluded that the use of PCD as well as PNA, in patients with abscess volume >150 ml enhances the clinical outcome and decreases the disease-related morbidity. Pigtail catheterization was found to be a better intervention modality than percutaneous needle aspiration in patients with an abscess volume of more than 300 ml. Large randomized control trials with a definite protocol will be required for effective protocols on the management of liver abscess.

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